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NATIONAL DAM SAFETY PROGRAM. SPRING LAKE DAM (INVENTORY NUMBER --ETC(U)
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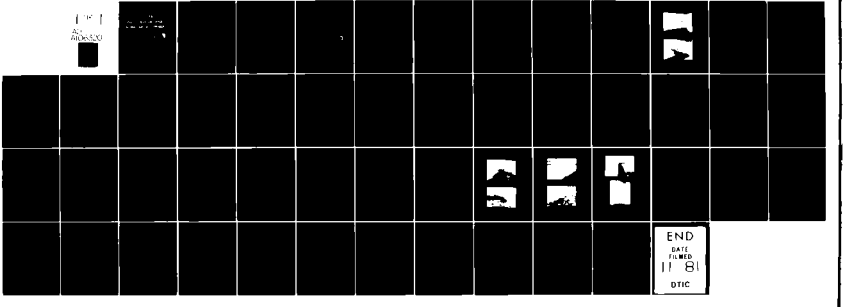

POTOMAC RIVER BASIN

Name Of Dam: SPRING LAKE DAM

Location: WARREN COUNTY, VIRGINIA

Inventory Number: VA. NO. 18703

LEVEL II

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED FOR

NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK VIRGINIA 23510

BY

[redacted]

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER: VA 18703	2. GOVT ACCESSION NO.: AD-A106 320
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): Phase I Inspection Report National Dam Safety Program Spring Lake Dam Warren County, VA	5. TYPE OF REPORT & PERIOD COVERED: Final
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Schnabel Engineering Associates, P. C. J. K. Timmons and Asspciates, Inc.	8. CONTRACT OR GRANT NUMBER(s): DACW-65-81-D-0020
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Schnabel Engineering Associates, P. C. J. K. Timmons and Associates, Inc.	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: U. S. Army Engineer District, Norfolk 803 Front St., Norfolk, VA 23510	12. REPORT DATE: May 1981 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): National Dam Safety Program. Spring Lake Dam (PA Number 18703), Potomac River Basin, Warren County, Virginia. Phase I Inspection Report.	15. SECURITY CLASS. (of this report): Unclassified 15a. DECLASSIFICATION DOWNGRADING SCHEDULE
16. DISTRIB: (Inventory Number VA) Approved for public release; distribution unlimited	
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)	
18. SUPPLEMENTARY NOTES: National Technical Information Service,	
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)	
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)	

DD FORM 1473

20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

POTOMAC RIVER BASIN

NAME OF DAM: SPRING LAKE DAM
LOCATION: WARREN COUNTY, VIRGINIA
INVENTORY NUMBER: VA. NO. 18703

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED FOR
NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

BY

SCHNABEL ENGINEERING ASSOCIATES, P.C./
J. K. TIMMONS AND ASSOCIATES, INC.

TABLE OF CONTENTS

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam:	Spring Lake Dam
State:	Virginia
Location:	Warren County
USGS Quad Sheet:	Linden
Coordinates:	Lat 38° 59.1' Long 78° 02.1'
Stream:	Tributary of Venus Branch
Date of Inspection:	May 5, 1981

Spring Lake Dam is a homogeneous earthfill structure about 300 ft long and 45 ft high. The principal spillway consists of a 15 inch diameter corrugated metal pipe (CMP) riser and a 12 inch diameter CMP outlet which extends through the structure. An earth emergency spillway is located at the right abutment with an 80 ft wide bottom and 3H:1V to 5H:1V side slopes. The dam is classified intermediate in size and is assigned a high hazard classification. The dam is located on a tributary of Venus Branch 2.5 miles east of Shenandoah Farms, Virginia. The lake is used for recreational purposes and is owned and maintained by The Shenandoah Property Owners Association..

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the appropriate Spillway Design Flood (SDF) is the PMF. The spillway will pass 60 percent of the Probable Maximum Flood (PMF) or 60 percent of the SDF without overtopping the dam. During the SDF, the dam will be overtopped by a maximum of 0.6 ft for a period of 1 hour and reach a maximum velocity of 3.4 fps. Flows overtopping the dam during the SDF are not considered detrimental to the embankment with respect to erosion. The spillway is judged inadequate, but not seriously inadequate.

The visual inspection revealed no apparent problems. An evaluation of the stability condition could not be made since there is insufficient design and construction data for this structure. The embankment slopes meet U. S. Bureau of Reclamation requirements, however, the embankment crest is narrower than recommended. Based on the visual inspection, the design data and the performance history of the structure, the narrow crest is not considered a serious problem and a stability check is not required.

It is recommended that the owner implement an emergency action plan to warn the downstream dwellings of any dangers which may be imminent.

The following routine maintenance and observation functions should be initiated within the next twelve months:

The grass and weeds on the dam embankment and in the emergency spillway should be cut at least once a year and preferably twice a year. Maintenance is recommended in the early summer and fall. Existing trees on the dam should be cut to the ground. Trees greater than 3 inches in diameter should have their stumps and root structures removed and resulting holes backfilled. The fallen tree(s) adjacent to the principal spillway discharge outlet should be removed.

Vehicular traffic should be restricted on the dam and bare areas on the embankment crest should be reseeded. The toe drain outlet(s) should be located, uncovered and allowed to flow freely. The two iron stained wet areas located to the left of and below the principal spillway discharge outlet should be monitored quarterly to detect any flow which could cause

piping in the embankment. If increased flows should occur, a geotechnical engineering consultant should be engaged to evaluate the problem. Riprap should be placed below the principal spillway discharge outlet to restrict erosion during flooding. A staff gage should be installed to monitor water levels.

Prepared by:

SCHNABEL ENGINEERING ASSOCIATES, P.C./
J. K. TIMMONS & ASSOCIATES, INC.

Ray E. Martin, Ph.D., P.E.
Commonwealth of Virginia

Submitted by:

Original signed by:
Carl S. Anderson, Jr.

Carl S. Anderson, Jr., P.E.
Acting Chief, Design Branch

Approved:

Original signed by:
Ronald E. Hudson

Ronald E. Hudson
Colonel, Corps of Engineers
Commander and District Engineer

Recommended by:

Original signed by
JAMES A. WALSH

Jack G. Starr
Chief, Engineering Division

Date: SEP 11 1981

Spring Lake

Dam

Appendix: Photographs

The principal spillway consists of a 15 inch diameter corrugated metal pipe (CMP) riser inlet. The riser is connected to a 12 inch diameter CMP outlet which runs through the dam. The riser crest is at elevation 850 msl. An 8 inch diameter sluice gate in the riser at an invert elevation of 818 msl is used to drain the lake. The outlet pipe has a length of 142 ft with an invert elevation at the outlet structure of 810 msl. (See Plate 2, Appendix I).

The emergency spillway (EMS) consists of a vegetated earthen channel located at the right abutment, with a crest elevation of 852.5 msl. The EMS has a bottom width of 80 ft, 3H:1V to 5H:1V side slopes and a cut section (See Plate 3, Appendix I and Field Sketch 1, Appendix II).

1.2.2 Location: Spring Lake Dam is located on a tributary of Venus Branch 2.5 miles east of Shenandoah Farms, Virginia. (See Plate 1, Appendix I)

1.2.3 Size Classification: The dam is classified as an intermediate size structure based on its height as defined in Reference 1, Appendix I.

1.2.4 Hazard Classification: The dam is located in a rural area however, based upon the proximity of two inhabited dwellings located ¼ mile downstream, the dam is assigned a "high" hazard classification. The hazard classification used to categorize a dam is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: The dam is owned and maintained by the Shenandoah Farms Property Owners Association.

SECTION [illegible] HYDRAULIC/HYDROLOGIC DATA

[illegible]esign: Spring Lake Dam was designed by the Soil Conserva-[illegible] as a [illegible]-purpose dam. Hydrologic and hydraulic [illegible] available.

[illegible]ydrologic Records: There are no records available.

[illegible] Experience: Information on flooding experience could not [illegible]

[illegible] tentative: In accordance with the established guide-[illegible] design flood is based on the estimated "Probable Maximum [illegible]" is the [illegible] flood discharges that may be expected [illegible] severe combination of critical meteorologic and hydrologic [illegible] that are reasonably possible in the region, or fractions [illegible] Probable Maximum Flood (PMF) and ½ PMF hydrographs were [illegible] the HEC-1 method (Reference 4, Appendix IV). Precipitation [illegible] the flood hydrograph of the PMF were taken from U. S. [illegible] Information (Reference 5, Appendix IV). Appropriate [illegible] for basin size and shape were accounted for. These [illegible] were routed through the reservoir to determine maximum [illegible].

[illegible] Reservoir Regulations: For routing purposes, the pool at the beginning of flood assumed to be at elevation 850 msl. Reservoir

stage-storage data and stage-discharge data were computed from design details, field sketches and available topographic data. Floods were routed through the reservoir using the principal spillway discharge up to a pool storage elevation of 852.5 msl and a combined principal and emergency discharges for pool elevations above 852.5 msl. Pool elevations above 855 msl were routed over the non-overflow section of the dam.

5.6 Overtopping Potential: The predicted rise of the reservoir pool and other pertinent data were determined by routing the flood hydrographs through the reservoir as previously described. The results for the flood conditions (PMF and ½ PMF) are shown in the following Table 5.1:

Table 5.1 - RESERVOIR PERFORMANCE

	Hydrograph		
	Normal Flow	½ PMF	PMF
Peak Flow, CFS			
Inflow	.1	711	14.21
Outflow	.1	711	1370
Maximum Pool Elevation			
Ft, msl	850	854.9	855.6
Non-Overflow Section (Elev 855 msl)			
Depth of Flow	-	-	.6
Duration, Hours	-	-	1
Velocity, fps*	-	-	3.4
Tailwater Elevation			
Ft, msl	810	813.6	814.5

*Critical velocity

5.7 Reservoir Emptying Potential: An 8 inch diameter gate at elevation 818 msl is capable of draining the reservoir through the outlet pipe. Assuming that the lake is at normal pool elevation (850 msl) and there is .1 cfs inflow, it would take approximately 3 days to lower the reservoir to elevation 818 msl. This is equivalent to an approximate drawdown rate of 10 ft/day based on the hydraulic height measured from normal pool to the invert of the drawdown pipe divided by the time to dewater the reservoir.

5.8 Evaluation: The U. S. Army, Corps of Engineers' guidelines indicate the appropriate Spillway Design Flood (SDF) for an intermediate size, high hazard dam is the PMF. The spillway will pass 60 percent of the PMF without overtopping the crest of the dam (60 percent of the SDF). During the SDF, the dam will be overtopped by a maximum of 0.6 ft for a period of 1 hour at a maximum velocity of 3.4 fps.

SECTION 6 - DAM STABILITY

6.1 Foundation and Abutments: The dam is located in the western portion of the Blue Ridge physiographic province of Virginia. The majority of the dam is underlain by the Weverton Formation of Cambrian age; however, the right end of the dam is underlain by the [illegible] Formation of late Precambrian age. The Catoctin consist [illegible] dark to grayish green metabasalt, purple phyllite and metaconglomerate. The Weverton includes an upper quartz-pebble conglomerate with [illegible] interbeds, a middle sandy phyllite with [illegible], and a lower quartz and quartz pebble conglomerate with interbeds [illegible]. The [illegible] is located [illegible] approximately [illegible] to the [illegible]. [illegible] the [illegible] to the [illegible].

Overtopping is not considered a problem because of the small [illegible] and duration of flood. Also the velocity of 3.4 fps is less than the effective eroding velocity for a vegetated earth embankment, approximately 6 fps. Some erosion is anticipated on the downstream slope during overtopping; however, it is not considered to be great enough to create a stability problem. Since no undue settlement, cracking, or seepage was noted at the time of inspection, it appears that the embankment is adequate for control storage at elevation 850 msl.

The saturated ground condition present along the downstream toe is believed to be related to flow from the toe drain(s) and also seepage through the dam. Attempts should be made to locate the toe drain outlet(s) and remove any cover material, so as to allow free flow. The two small stained areas observed adjacent to and below the discharge pipe are believed to be related to seepage through the dam even though no flow was observed. This does not necessarily create an unsafe condition; however, these areas should be monitored periodically in attempt to detect any significant increases in flow which may result in piping within the embankment.

APPENDIX I

MAPS AND DRAWINGS

SPRING LAKE

Blue Mountain

R I D G E

SCALE 1" = 24,000'

PLATE 1

LINDEN QUADRANGLE
VIRGINIA

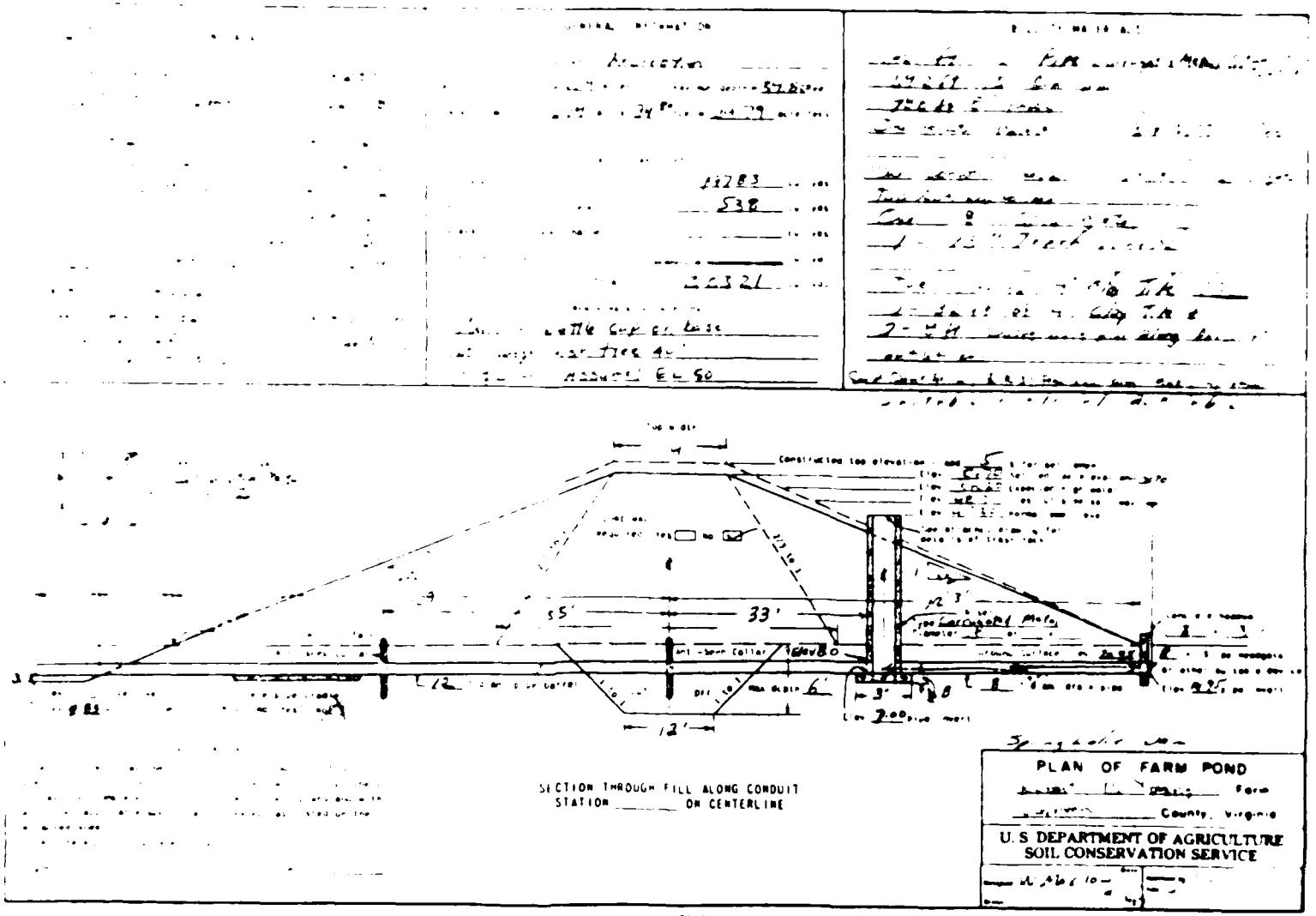

55'
33'
12'
SECTION THROUGH FILL ALONG CONDUIT
STATION _____ ON CENTERLINE
PLAN OF FARM POND
U. S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PLATE 2

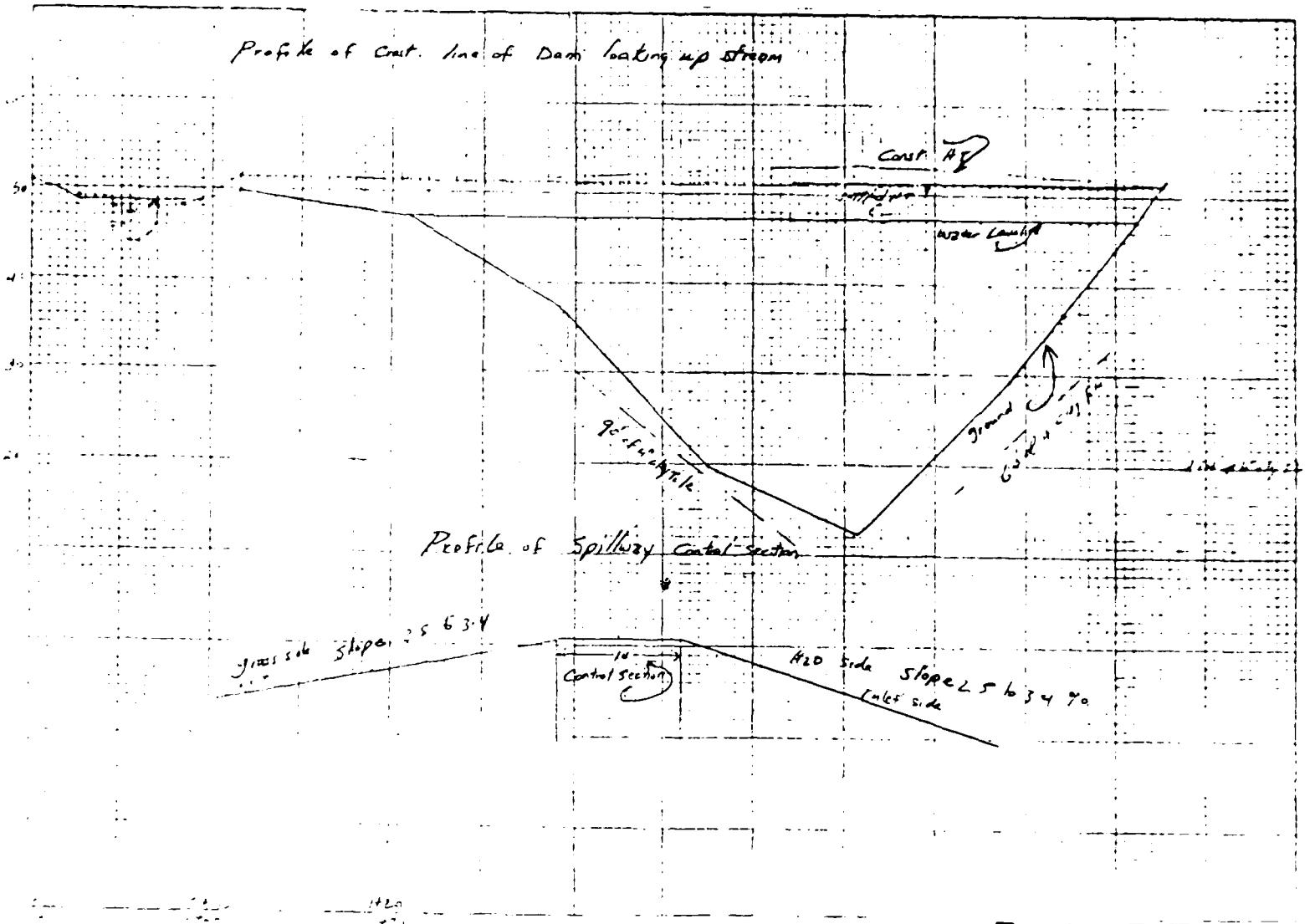
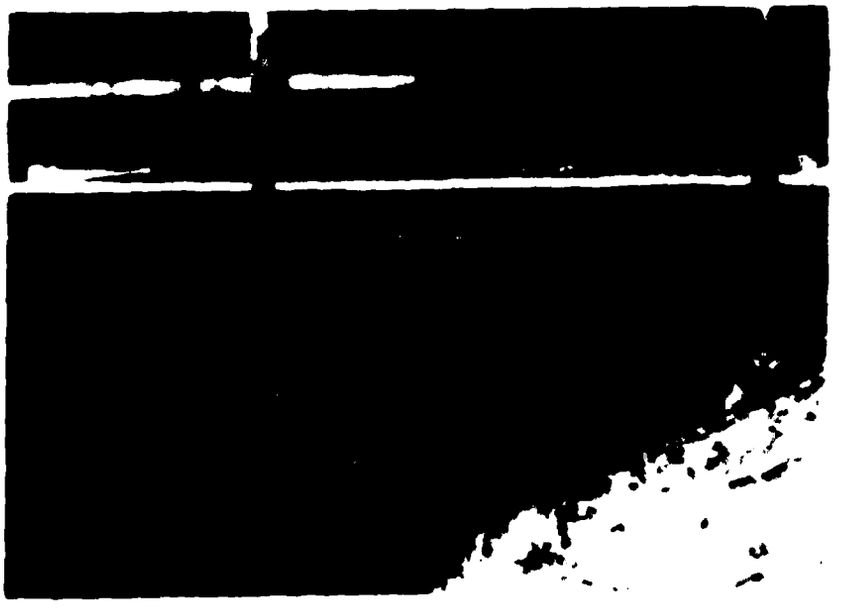

Profile of Cent. line of Dam looking up stream
Const. Top
water Level
ground
Profile of Spillway Contol Section
grass side Slope 2:5 to 3:4
10'
Control Section
H2O side Slope 2:5 to 3:4
Inlet side

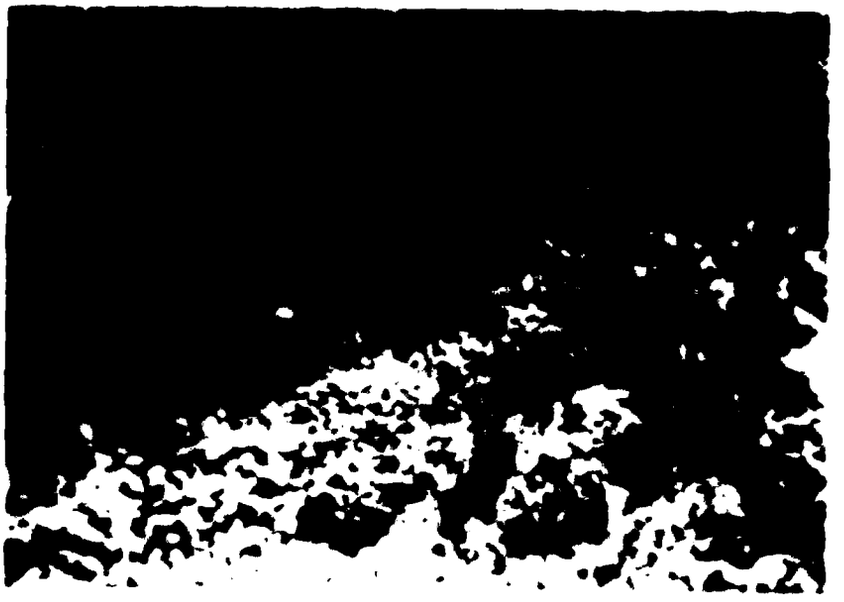
PLATE 3

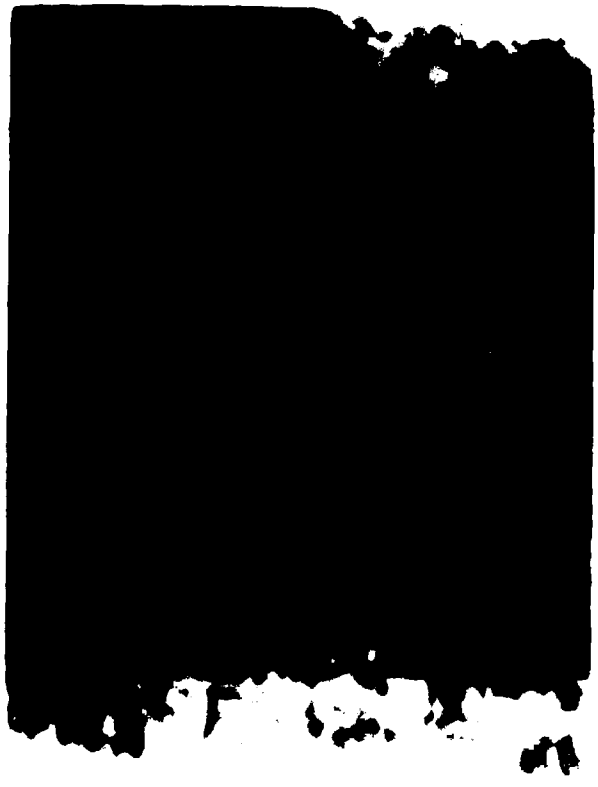
APPENDIX II

PHOTOGRAPHS

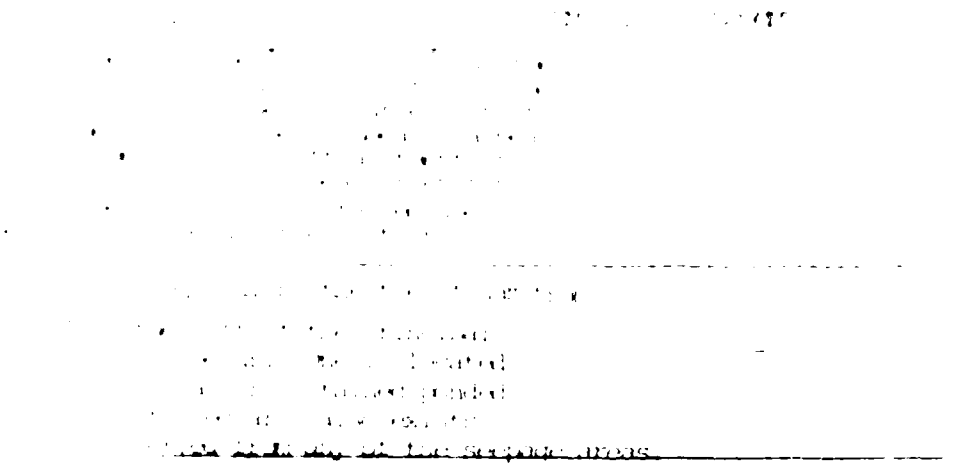
Photograph No. 1 - Upstream Face of Dam







		-
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The vertical and horizontal alignment of the dam appeared to be good.	-
RIPRAP FAILURES	No riprap was observed.	-



to coarse sand,
- brown (SC). Includes

ment slopes. Crest is
traffic up to
occur along the
Sketch 1.

REMARKS AND RECOMMENDATIONS
Principal spillway in good condition.

VISUAL EXAMINATION	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
SLOPES	Steep, rocky and heavily wooded slopes bound the left side of the reservoir. Moderate (3H:1V), wooded to open slopes bound the rear and right side. A road bounds the right side. The area appears to be stable. The lake is 2 ft± below the high water mark visible along the upstream slope, above pool level. The reservoir was free of debris.	No erosion noted.
SEDIMENTATION	Clear water, no apparent sedimentation.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF

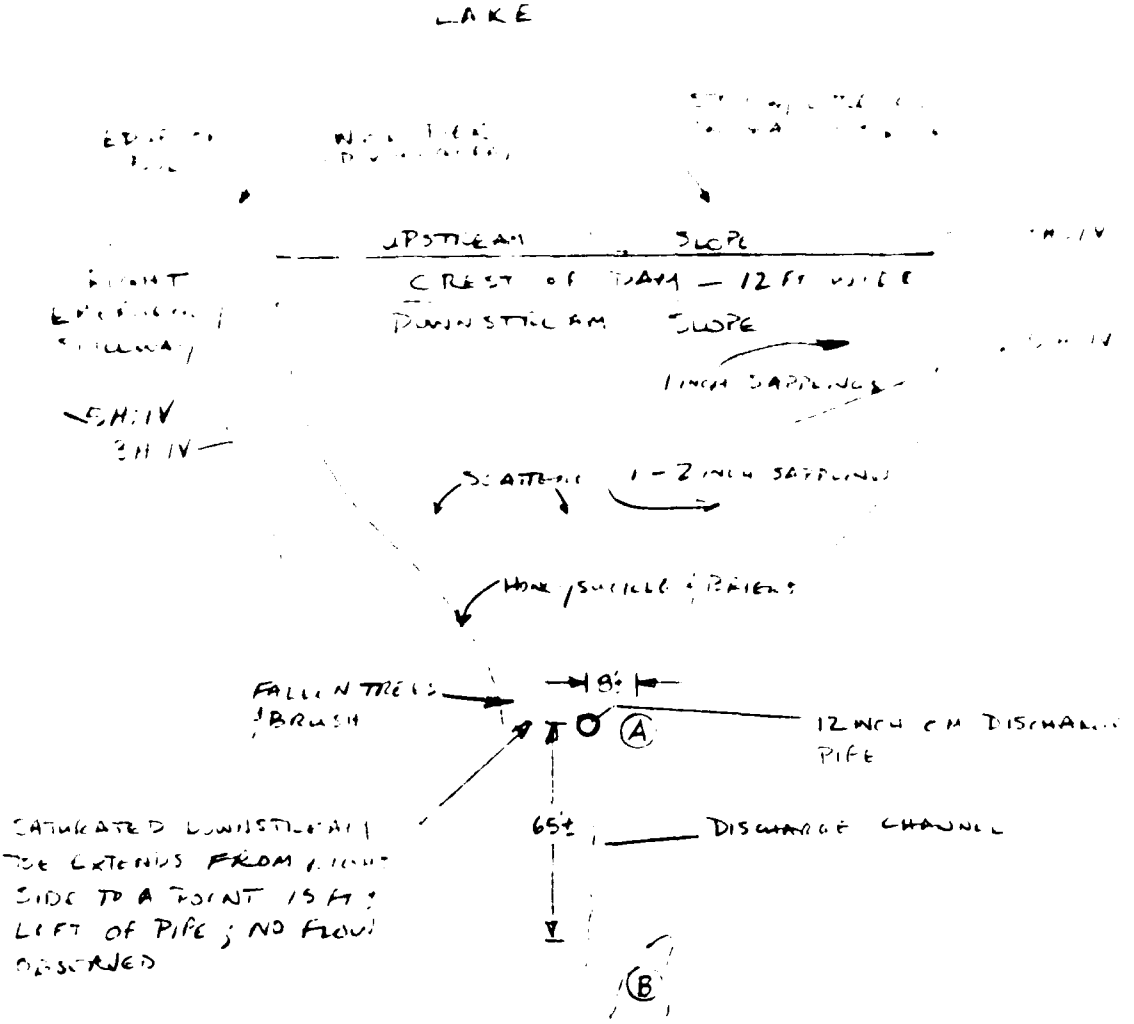
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Downstream channel is 30 ft [illegible]. channel is vegetated with [illegible]. overbanks have an [illegible].
SLOPES	The slopes are steep to [illegible] vegetated areas. The [illegible]
APPROXIMATE NO. OF HOMES AND POPULATION	Two dwellings located on [illegible] downstream.

CHECK LIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
REGIONAL VICINITY MAP	Linden Quadrangle; U.S.G.S. 7½ minute topographic sheet.
DESIGN/CONSTRUCTION HISTORY	The dam was designed by USDA, SCS and constructed by Stuart Vaught. The dam was completed in 1968.
PLAN OF DAM	See Plates 2 and 3, Appendix III.
TYPICAL SECTIONS OF DAM	See Plates 2 and 3, Appendix III
OUTLETS - PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	See Plates 2 and 3, Appendix III
SPILLWAY- PLAN SECTION DETAILS	See Field Sketch.
OPERATING EQUIPMENT - PLAN DETAILS	Not available.



(A) RED IRON STAINED SEEPAGE; NO FLOW OBSERVED.

(B) RED IRON STAINED PONDED AREA 40 FT ± LONG AND 10 FT ± WIDE; NO FLOW OBSERVED.

NOTE: EMBANKMENT 300 FT ± LONG
EMS 80 FT ± WIDE

END

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